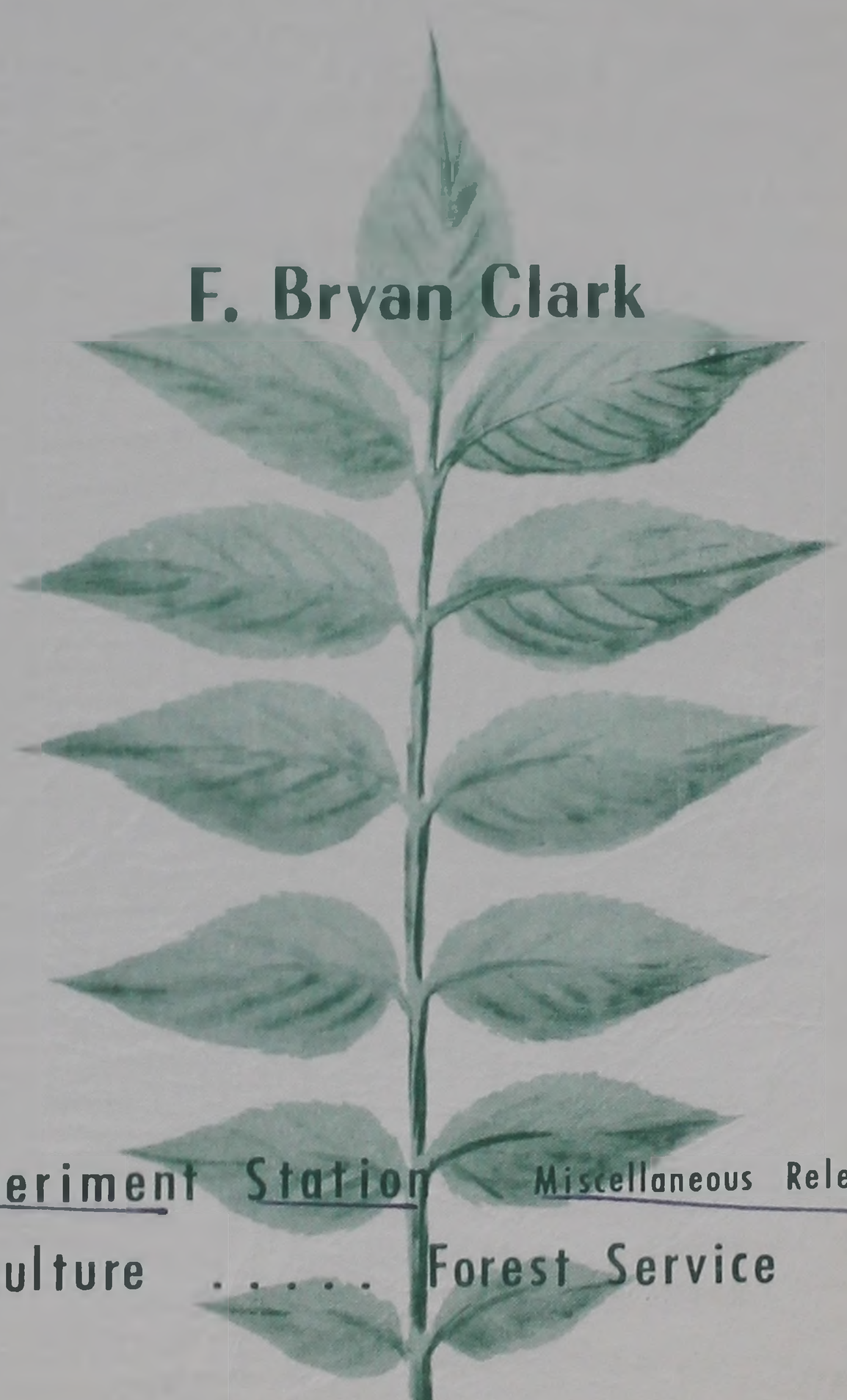
c.1
28

SILVICAL CHARACTERISTICS of

BUTTERNUT

F. Bryan Clark



Central States Forest Experiment Station — Miscellaneous Release 28
U. S. Department of Agriculture ..... Forest Service

This is the fourteenth of a series of 17 papers dealing with the silvical characteristics of forest trees important in the Central States region. The following species are included in this series. (Those marked with an asterisk have already been published.)

*Ohio buckeye
Yellow buckeye
*Northern red oak
*Black oak
*Chinkapin oak
*Pin oak
*White oak
*Swamp white oak
*Bur oak
*Butternut
*Black walnut
*Shellbark hickory
*Sycamore
*Honeylocust
Hackberry
Black locust
*Eastern redcedar

Papers covering additional important American species will be issued by other Forest Experiment Stations of the U. S. Forest Service.

Central States Forest Experiment Station, U. S. Dept. of Agriculture
Forest Service, 111 Old Federal Building, Columbus 15, Ohio
W. G. McGinnies, Director

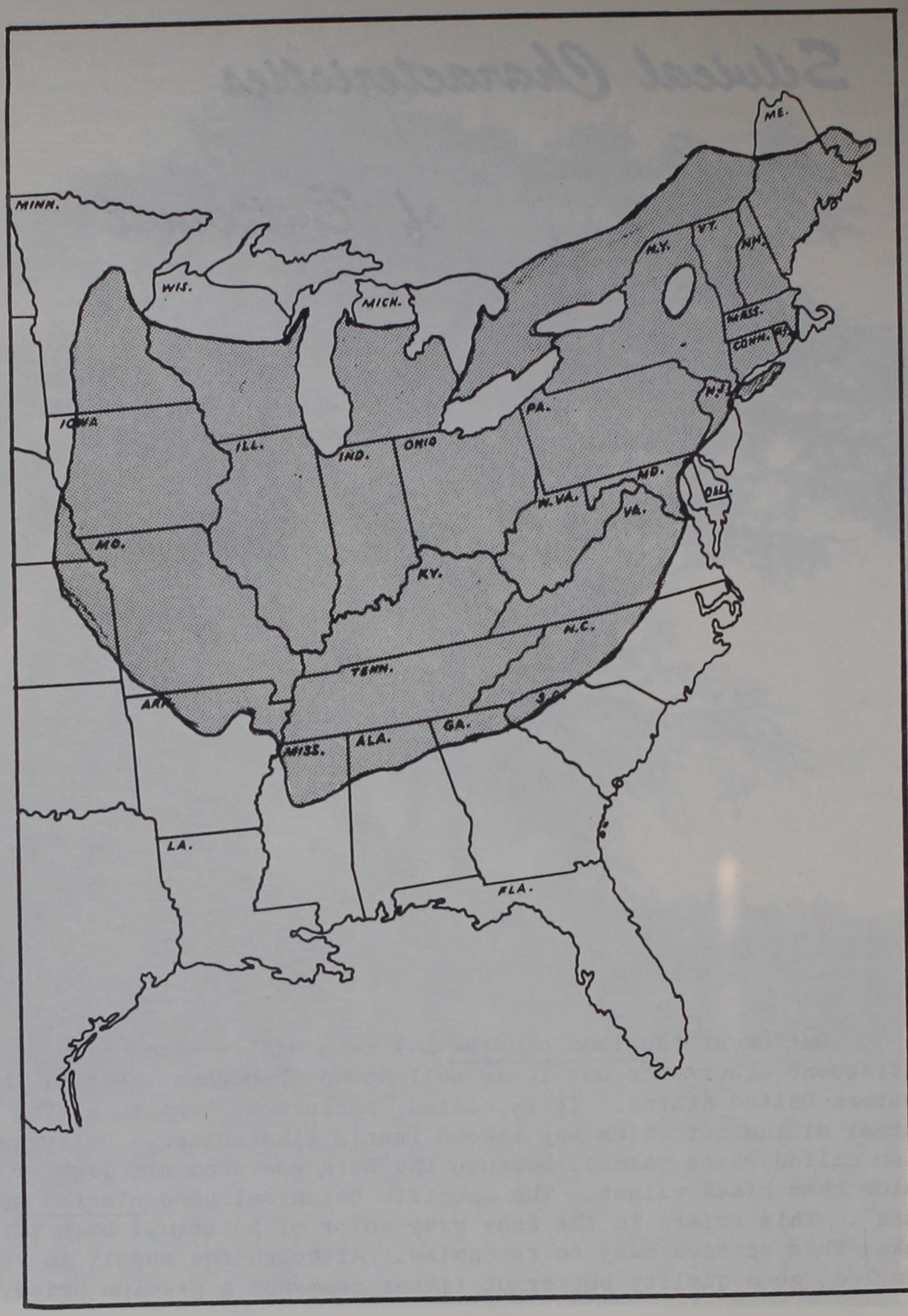
July 1958

Silvical Characteristics of Butternut

F. BRYAN CLARK, forester
Bedford Field Office

Butternut (Juglans cinerea L.) is a medium-sized tree of only infrequent occurrence but it is well known throughout most of the eastern United States. It is called "butternut" because of the oily kernel of the nut which may becme rancid like butter. Butternut is also called white walnut, because the bark and wood are lighter in color than black walnut. The specific botanical name cinerea means "ash". This refers to the ashy gray color of butternut bark that makes this species easy to recognize. Although the supply is very limited, good quality butternut timber commands a premium price.

DISTRIBUTION



SITE

Climate

Climatic conditions (19)[1] within the botanical range of butternut vary rather widely. The mean annual temperature ranges from 60° F in Alabama to 40° F in New Brunswick. Temperatures may range from a maximum of 105° F to a minimum of -30° F. Annual precipitation varies from 25 to 30 inches in southeastern Minnesota to 80 inches in the southern Appalachians. The frost-free period ranges from 7 months in the southern part of the range to 3 1/2 months in the northern part.

Soils and Physiography

Butternut develops best on deep, moist, loamy soils. It grows along stream banks and thrives in well drained, gravelly soil (7). This species rarely occurs on compact soils. It is reported that butternut will grow better than black walnut on the drier rocky soils (17) especially those of limestone origin (11).

Butternut is found in coves, on stream benches and terraces, on slopes, in the talus of rock ledges, and on other sites with good soil drainage. Harlow and Harrar (11) report that it is found up to an elevation of 4,800 feet in the Virginias.

Associated Species

Because of its extensive range, butternut is associated with many species. Braun (4) and others, (10, 11, 15, 16, 20) list a large number of species in the mixed mesophytic hardwoods that occur in types containing butternut. Common butternut associates are: basswood, black cherry, beech, black walnut, elm, hemlock, hickory, oak, red maple, sugar maple, yellow-poplar, white ash and yellow birch. Harlow and Harrar (11) and Smith (15) report that in the northern part of its range butternut may occasionally be found with white pine.

Butternut is listed as an associate species in three types in Forest Cover Types of North America (16): black cherry, white oak - red oak - hickory, northern red oak - basswood - white ash.

Stands seldom contain more than an occasional butternut tree, although in local areas it may occur abundantly (11). In the past the States of West Virginia, Wisconsin, Indiana, and Tennessee have been the leading producers of butternut timber (3).

1/ Numbers in parenthesis refer to Literature Cited, p. 8

In a study on the influence of black walnut and butternut on other vegetation, Massey (13) concluded that these species have an "antagonistic" action which causes withering and death of certain cultivated plants. He further concluded that the toxic material is localized in the vicinity of the roots.

Seeding Habits

The flowers of butternut occur along with late forming leaves from April to June depending upon the location and altitude (7, 8, 11). Butternut is monoecious and has inconspicuous flowers.

The fruit, an ovoid nut 2 to 3 inches long, matures in September and October. Nuts occur singly or in clusters from 2 to 5. The kernel of the nut is sweet, oily, and edible. A thin indehiscent husk covers the nut. The fruit usually remains on the trees until after leaf-fall. Commercial seed bearing age starts at about 20 years and reaches optimum at 30 to 60 years. Good crops of seed can be expected every 2 to 3 years with light crops during intervening years. Thrifty trees may yield from 1/4 to 1 bushel of cleaned seed. The seed have a high percentage of soundness with an average germinative capacity of 75 percent. Seed collected for planting should be kept cool and moist (18).

Upon ripening, the seed is dispersed by gravity and rodents. Butternut seeds are buried by rodents, chiefly squirrels, and this accounts for a large share of the seedlings in natural stands.

Vegetative Reproduction

Like many other hardwoods, butternut will sprout when the top is seriously injured or killed. Butternut, like black walnut, probably can be grafted.

Seedling Development

Seeds of butternut usually germinate the spring following their maturity but some of them will remain dormant past the usual germinating period. Rich, loamy, moist soil is ideal for germination.

Butternut seedlings develop a taproot, except in shallow soils (11). Seedling growth is rapid on good sites with ample light. Seedlings will grow well with shade from the sides, but not under dense overhead shade (18). This species is considered difficult to transplant (17).

Sapling Stage to Maturity

The growth of butternut is fast, especially in young trees. On favorable sites the root system is deep but may be widespreading (17). In relation to its common tree associates, butternut is very shortlived. Harlow and Harrar (11) state that trees of this species usually do not live past 75 years.

Mature trees rarely reach a height of more than 100 feet and a diameter of 3 feet. Average-sized trees reach from 40 to 60 feet in height and 1 to 2 feet in diameter (11, 15). Forest-grown trees usually have a rather short, clear bole with stout ascending branches and a broad, open crown.

Although young trees may withstand competition from the side with the consequent development of a clean bole, butternut will not survive with dense overhead competition. Large trees must be in the overstory to thrive. The species is classed by Baker (1) and Betts (3) as intolerant to competition.

Within its optimum range and on good sites butternut is considered a desirable component of forest stands. However, Westveld (20) lists butternut as one of the "less desirable" species in Southern Appalachian coves.

The very spotty occurrence of butternut and its intolerance to shade indicates that it exists in undisturbed stands by virtue of natural openings in the crown canopy. Butternut is a minor species in the mesophytic climax types on rich moist sites throughout the northern two-thirds of eastern United States.

Enemies and Hazards

Insect enemies of butternut are often found on associated species and, in many cases are general feeders on other hardwoods. Some insects commonly found on butternut are: Acordulecera, Agrilus juglandis, Blennocampa caryae, Chrysobothris sexsignata, Citheronia regalis, Conotrachelus juglandis, Corythucha juglandis, Cressonia juglandis, Datana angusii, Datana integerrima, Halisidota caryae, Phyllophaga futilis, Saperda discoidea, and Scolytus quadrispinosus (6).

Butternut is one of many hosts for Nectrias which cause cankers (2). The most widespread and serious disease of the species is an ascomycete, Melanconis juglandis (9). The disease very likely extends over the species' entire range. This disease is slowly progressive, causing the death of more and more branches. Dead branches

on butternut are so common in many areas that their presence can be used to help identify the tree. The tree slowly weakens and eventually dies. Graves (9) believed in 1927 that the disease was not a serious threat to the existence of butternut. However, there are areas where nearly all trees are diseased to some extent.

Butternut is very susceptible to fire damage. Although the species is generally wind firm it is subject to frequent storm damage (3, 17).

RACES AND HYBRIDS

The following hybrids of butternut are listed by Sargent (14): Juglans cinerea X Juglans quadrangulata; a natural hybrid with Juglans regia is found in eastern Massachusetts; and a hybrid with the Japanese Juglans sieboldiana, has appeared in the United States. No hybrids or races are listed by Little (12).

SPECIAL FEATURES

Early settlers found the inner bark of butternut to have medicinal properties and the specific name cathardica has been used (5). The sap has a high sugar content in early spring and butternut trees have been tapped like sugar maple.

The fruit is eaten by man and rodents. Butternuts have long been a favorite of confectioners and home-candy makers. Pioneers extracted a dye from the husks for coloring homespun clothing. During the Civil War backwoods troops were called "Butternuts" after the color of their clothes (15).

The properties of butternut wood are very similar to black walnut. The most notable difference is the color, butternut being lighter. The wood is soft, coarse grained, easily worked, does not warp or crack, and takes a high polish.

TREE SPECIES MENTIONED

White ash	-	*Fraxinus americana* L.
Basswood	-	*Tilia americana* L.
Beech	-	*Fagus grandifolia* Ehrb.
Yellow birch	-	*Betula alleghaniensis* Britton
Black cherry	-	*Prunus serotina* Ehrb.
Elm	-	*Ulmus* spp. L.
Hemlock	-	*Tsuga canadensis* (L.) Carr.
Hickory	-	*Carya* spp. Nutt.
Red maple	-	*Acer rubrum* L.
Sugar maple	-	*A. saccharum* Marsh.
Oak	-	*Quercus* spp. L.
White pine	-	*Pinus strobus* L.
Black walnut	-	*Juglans nigra* L.
Yellow-poplar	-	*Liriodendron tulipifera* L.

LITERATURE CITED

(1) Baker, Frederick S.
1949. A revised tolerance table. Jour. Forestry 47: 179-181.

(2) Baxter, Dow Vawter
1943. Pathology in forest practice. 618 pp., illus. New York.

(3) Betts, H. S.
1945. Butternut. U. S. Forest Serv., 4 pp.

(4) Braun, E. Lucy
1950. Deciduous forests of eastern North America. 596 pp., illus. Philadelphia.

(5) Brown, Daniel Jay
1832. The sylva Americana, description of United States forest trees practically and botanically considered. 408 pp., Boston.

(6) Craighead, F. C.
1950. Insect enemies of eastern forests. U. S. Dept. Agr. Misc. Pub. No. 657. 679 pp., illus.

(7) Deam, Charles C. and Shaw, T. E.
1953. Trees of Indiana, 3 rev. ed. Ind. Dept. Conserv. Pub. No. 13a. 330 pp., illus. Indianapolis.

(8) Fernald, Merritt Lyndon
1950. Gray's manual of botany, 8 ed. 1,632 pp., illus. New York Cincinnati (etc.).

(9) Graves, A. H.
1923. The melanconis disease of the butternut (Juglans cinerea l.). Phytopathology 13: 411-435.

(10) Griggs, Robert F.
1914. A botanical survey of the sugar grove region. Ohio Biol. Surv. Vol. 1, Bul. 3: 244-340., illus.

(11) Harlow, William M., and Harrar, Elwood S.
1941. Textbook of dendrology, 2 ed. 542 pp., illus. New York and London.

(12) Little, Elbert L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U. S. Forest Serv. Agr. Handb. No. 41. 472 pp.

(13) Massey, A. B.
1925. Antagonism of the walnuts (Juglans nigra l. and J. cinerea l.) in certain plant associations. Phytopathology 15: 773-784.

(14) Sargent, Charles S.
1933. Manual of the trees of North America. 910 pp., illus. Boston and New York.

(15) Smith, N. F.
1952. Butternut -- Juglans cinerea l. Mich. Cons. 21: 23-24.

(16) Society of American Foresters
1954. Forest cover types of North America (exclusive of Mexico). 67 pp., illus. Washington.

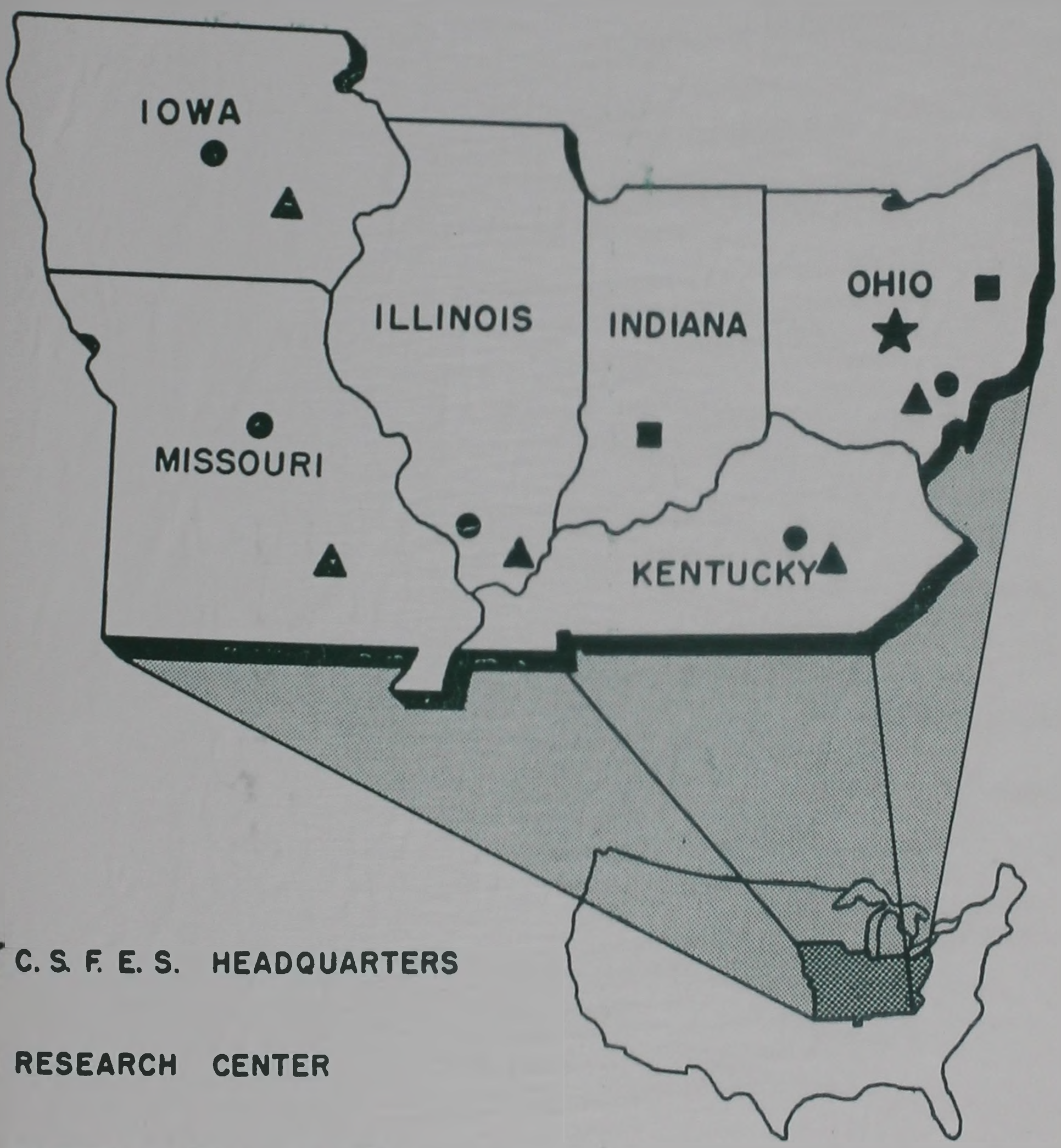
(17) Van Dersal, William R.
1938. Native woody plants of the United States, their erosion-control and wildlife values. U. S. Dept. Agr., Misc. Pub. No. 303. 362 pp., illus.

(18) U. S. Forest Service
1948. Woody-plant seed manual. U. S. Dept. Agr. Misc. Pub. No. 654. 416 pp., illus.

(19) U. S. Department of Agriculture
1941. Climate and man: Agr. Yearbook 1941. 1,248 pp., illus.

(20) Westveld, R. H.
1939. Applied silviculture in the U. S. 567 pp., New York.

TERRITORY SERVED BY THE
CENTRAL STATES FOREST EXPERIMENT STATION
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE



★ C. S. F. E. S. HEADQUARTERS

● RESEARCH CENTER

▲ EXPERIMENTAL FOREST

■ BRANCH OFFICE